

Appl. No.: 10/779,973
Amendment Dated October 18, 2005
Reply to Office Action of July 18, 2005

GRY-117US

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) ~~Valve~~ A valve actuator for internal combustion engines, comprising at least one electromagnet having a coil and a magnetic plate, whose movement controls the displacement of the valve, wherein the parameters of the electromagnet and of the plate are such that at least part of the magnetic circuit formed by the electromagnet and the plate is in a state of magnetic saturation when the magnetic plate is in the proximity of the electromagnet, so as to minimize the force of attraction exerted on the plate and therefore its velocity; the parameters of the electromagnet and of the plate and the shape of the plate being such that the magnetic circuit is in the state of magnetic nonsaturation when the plate is located at a distance from the electromagnet, so as to maximize the force attraction exerted on the plate and therefore to minimize the switching time, wherein the plate has flat faces.
2. (Currently Amended) ~~Actuator~~ The valve actuator in accordance with claim 1, wherein the parameters are such that at least part of the magnetic circuit is in the state of magnetic saturation for an air gap between the plate and the electromagnet of between 0 mm and at most 1 mm.
3. (Currently Amended) ~~Actuator~~ The valve actuator in accordance with claim 1 or 2, wherein the parameters of the electromagnet and of the plate comprise parameters related to at least one of the shape, the dimensions of the plate, the nature of the material forming the plate and the body of the electromagnet and the intensity of the current flowing through the coil of the electromagnet.
4. (Currently Amended) ~~Actuator~~ The valve actuator in accordance with claim 3, wherein the thickness of the plate is such that this plate is magnetically saturated in the proximity of the electromagnet.
5. (Currently Amended) ~~Actuator~~ The valve actuator in accordance with claim 3, wherein the magnetic plate has at least one contracted part intended to be saturated when this plate is located in the proximity of the electromagnet.

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GRY-117US

6. (Currently Amended) ~~Actuator~~ The valve actuator in accordance with claim 3, wherein the material forming the plate has a lower saturation threshold than the material forming the body of the electromagnet.

7. (Currently Amended) ~~Acuator~~ The valve actuator in accordance with one of the claims 1 or 2, further comprising a regulator controlling the current in the electromagnet.

8. (Currently Amended) ~~Internal~~ An internal combustion engine, comprising:
at least one valve actuator in accordance with claim 1 or 2.

9. (New) A valve actuator for internal combustion engines, comprising:
at least one electromagnet having a coil and
a magnetic plate, whose movement controls the displacement of the valve,

wherein the parameters of the electromagnet and of the plate are such that at least part of the magnetic circuit formed by the electromagnet and the plate is in a state of magnetic saturation when the magnetic plate is in the proximity of the electromagnet, so as to minimize the force of attraction exerted on the plate and therefore its velocity; the parameters of the electromagnet and of the plate and the shape of the plate being such that the magnetic circuit is in the state of magnetic nonsaturation when the plate is located at a distance from the electromagnet, so as to maximize the force attraction exerted on the plate and therefore to minimize the switching time, wherein an air gap is provided between the electromagnet and the magnetic plate when the plate is adjacent to the electromagnet.

10. (New) The valve actuator in accordance to claim 9, wherein when the air gap is provided between the electromagnet and the plate when the latter is adjacent to the electromagnet, the plate has recesses on each face, each recess having a flat bottom parallel to an outward corresponding face, and separated by walls perpendicular to such flat faces.

11. (New) The valve actuator in accordance with claim 9, wherein the parameters are such that at least part of the magnetic circuit is in the state of magnetic saturation for an air gap between the plate and the electromagnet of between 0 mm and at most 1 mm.

Appln. No.: 10/779,973
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12. (New) The valve actuator in accordance with claim 9, wherein the parameters of the electromagnet and of the plate comprise parameters related to at least one of the shape, the dimensions of the plate, the nature of the material forming the plate and the body of the electromagnet and the intensity of the current flowing through the coil of the electromagnet.

13. (New) The valve actuator in accordance with claim 12, wherein the thickness of the plate is such that this plate is magnetically saturated in the proximity of the electromagnet.

14. (New) The valve actuator in accordance with claim 12, wherein the magnetic plate has at least one contracted part intended to be saturated when this plate is located in the proximity of the electromagnet.

15. (New) The valve actuator in accordance with claim 12, wherein the material forming the plate has a lower saturation threshold than the material forming the body of the electromagnet.

16. (New) The valve actuator in accordance with claim 9, further comprising a regulator controlling the current in the electromagnet.

17. (New) An internal combustion engine, comprising:

at least one valve actuator in accordance with claim 9.